

Chapter 3

Study Design and Methodology

3.0. INTRODUCTION

The evaluation of complex networked-based information services presents unusual challenges to researchers. Evaluations that examine a single dimension or aspect of such information services are likely to be limited in their utility. For this evaluation of U.S. Federal implementations of GILS, the investigators designed and developed a multi-method research approach appropriate for the multi-faceted nature of GILS. The investigators documented the proposed design of the study in the *Technical Proposal* (Moen & McClure, 1996a), which they submitted and had accepted by the contracting agency. Upon award of the contract, the investigators completed a *Work Plan* (Moen & McClure, 1996b) that detailed the research strategy, methodological approach, data collection and analysis activities, and other considerations in carrying out a rigorous assessment of GILS. The project advisory group reviewed and approved the *Work Plan*.

This chapter discusses the design of the study and the multi-method approach used in the evaluation. The chapter also reports on the extent of data collection, including numbers of activities accomplished and participants involved. Appendices C-1 through C-6 provide additional information on the study and contain detailed summaries of each data collection and analysis activity.

The architecture of GILS includes metadata (or pointers) that describe a range of government information resources (electronic as well as non-electronic), human intermediaries, technical standards, government-wide and agency policy, users, and various information technologies. GILS, as a networked information service, reflects a complexity resulting from the interaction of a number of dimensions including policy, content, users, technology, and standards. Evaluation methodology for complex, networked-based information resources is emerging due in part to the ARPA/NASA Digital Library Initiatives (see Allerton Institute, 1995, "How We Do User-Centered Design and Evaluation of Digital Libraries: A Methodological Forum"). The need to develop appropriate tools and methods for

evaluation and assessment of networked services is critical, especially those that incorporate a user-based perspective (McClure, 1994).

For the current evaluation study, the investigators anticipated that the GILS implementation process would differ from agency to agency. Each agency has its own type and quantity of resources to be described in GILS. Additionally, each agency has its own technological infrastructure, individual administrative expertise, and financial resources to implement such a service. These factors, along with the agency's culture, affected each agency's readiness to implement GILS.

Given the multi-faceted characteristic of GILS—policy, technology, standards, content, and users—the investigators crafted an evaluation research approach appropriate to the complex phenomenon of GILS and to the purposes and goals of the evaluation. A review of research methodology literature in the area of networked information services aided the study team in the design of the evaluation methodology.

3.1. RESEARCH METHODOLOGY LITERATURE RELATED TO NETWORKED INFORMATION SERVICES

Reviewing recent literature about networked information services evaluation offered insight into methodologies, but it also indicated that such evaluation methodologies are less than fully developed. Research methodology literature in the areas of networked information services, government use of networked information resources, assessments of free-nets, and the six NSF/ARPA/NASA Digital Library research projects provided information of interest to the investigators.

McClure (1991) emphasized the need for user-based techniques rather than system-driven techniques for evaluating networked information services. These techniques take into account “the particular communication behavior, information use patterns, and work environments of potential users.” McClure (1994) recommended four factors on

which to evaluate networked information services: extensiveness, efficiency, effectiveness, and impact. Specific techniques recommended were the use of focus groups, user logs, network-based data collection techniques, interviews, surveys, and site visits. Further research (McClure & Lopata, 1996), specifically in the academic networked environment, resulted in guidelines and suggestions that highlighted the value of using natural settings to more accurately assess the networked information service.

Networked information services, described by Bertot and McClure (1996), match the GILS environment in that there are multiple providers of the services, a range of information services available, growing use and access of the services, and a rapidly changing environment. Criteria for evaluating networked information services include service quality, usefulness, and the four factors previously cited by McClure (1994).

GILS is an example of a networked information service that occurs within a governmental setting. Bishop and Bishop (1995) highlighted the importance of user studies of networked information services for government accountability and effectiveness. They recognized that user studies need to reflect the complexity of human behavior and recommended new models for successful collaborations among users, social science researchers, and network decision makers.

User studies of free-nets also are of interest because these types of distributed networked information systems offer similarities to GILS. Newby & Bishop (1996) documented the methodology used to assess PrairieNet in Champaign, Illinois. This report used descriptive statistics of web server transaction logs to identify characteristics of the users who access PrairieNet. Patrick (1996) described the methodology used in a user survey of the National Capital FreeNet in Ottawa, Canada, which included a self-selected survey and a “random encouragement” survey.

Analysis of transaction log files offered another avenue for evaluation research. Noonan (1996) described the use of web usage statistics and listed four reasons for government agencies to be

interested in these sources of data. By analyzing web usage statistics, agency staff can demonstrate accountability, collect data to improve service, reach new audiences, and offer informative and useful means to disseminate information about the agency. The study offered the investigators practical guidelines for analyzing four common web transaction log files: access, error, referrer, and agent.

The six Digital Library research projects funded by the National Science Foundation (NSF), Advanced Research Projects Agency (ARPA), and the National Aeronautics and Space Administration (NASA) initiated a research stream helpful for evaluating distributed networked information services comparable to GILS. At the 1995 Allerton Institute, "How We Do User-Centered Design and Evaluation of Digital Libraries: A Methodological Forum," Bishop (1995) summarized the breadth of methodological issues addressed by the Digital Library Project researchers. She identified the data gathering techniques used by digital library (DL) researchers including log analysis, protocol analyses of user sessions, focus groups, in-depth interviews, user surveys, controlled observations with videotaping, collection of user comments and feedback, questionnaires, and written evaluations of testbed systems.

The Allerton Institute (1995) offered examples of research studies with methodological relevance to GILS evaluation efforts. At the Institute, Van House (1995) discussed user needs assessment and evaluation for the University of California – Berkeley's NSF/ARPA/NASA Digital Libraries Project. She identified three methodology areas which are "predecessor" in nature to digital library research: library evaluation with its focus on users' needs as the basis for evaluation, user-centered system design with its incorporation of user needs into system design, and usability analysis with its feedback methods.

Buttenfield's (1995) study, "User Evaluation for the Alexandria Digital Library Project," emphasized factors which researchers encounter when planning distributed network information services focusing on spatial data, which is a subset of material accessible through GILS. Methodological issues

for this project include targeting specific user classes, the lack of appropriate spatial metadata models, and a lack of understanding of user requirements. Both Van House and Buttenfield's work support methodological assumptions of the GILS evaluation project since the GILS evaluation also focused on user needs, on incorporating user needs into system design, on usability analysis, and on the need to target specific classes of users to determine user requirements.

The review of selected, recent methodology literature on evaluation of networked services clearly identifies such evaluations as an area under development. The investigators determined that the use of multiple methods to gather data is an emerging area of research methodology for evaluating networked information services. In addition, a focus on user needs is central in many of these studies. The research community is showing keen interest in developing new assessment strategies for evaluating networked information services.

3.2. AN EVALUATION FRAMEWORK FOR GILS

A multi-faceted information service such as GILS may be evaluated along different dimensions and from different perspectives. To accommodate the complexity of GILS, the investigators designed a framework that would guide a holistic approach to the evaluation. The framework identifies five interacting dimensions:

- **Policy:** policy goals and guidelines at both government-wide and agency levels that are shaping GILS
- **Users:** identification of user groups, their needs, their use of GILS, and their satisfaction with GILS
- **Technology:** technical implementation details including access mechanisms, implications of certain technology choices, and the effectiveness of that technology
- **Contents:** at the macro-level, what information resources are included in GILS; at the micro-level, the extent of

agency information resources described and the quality, degree of variance, accuracy, and usability of those descriptions

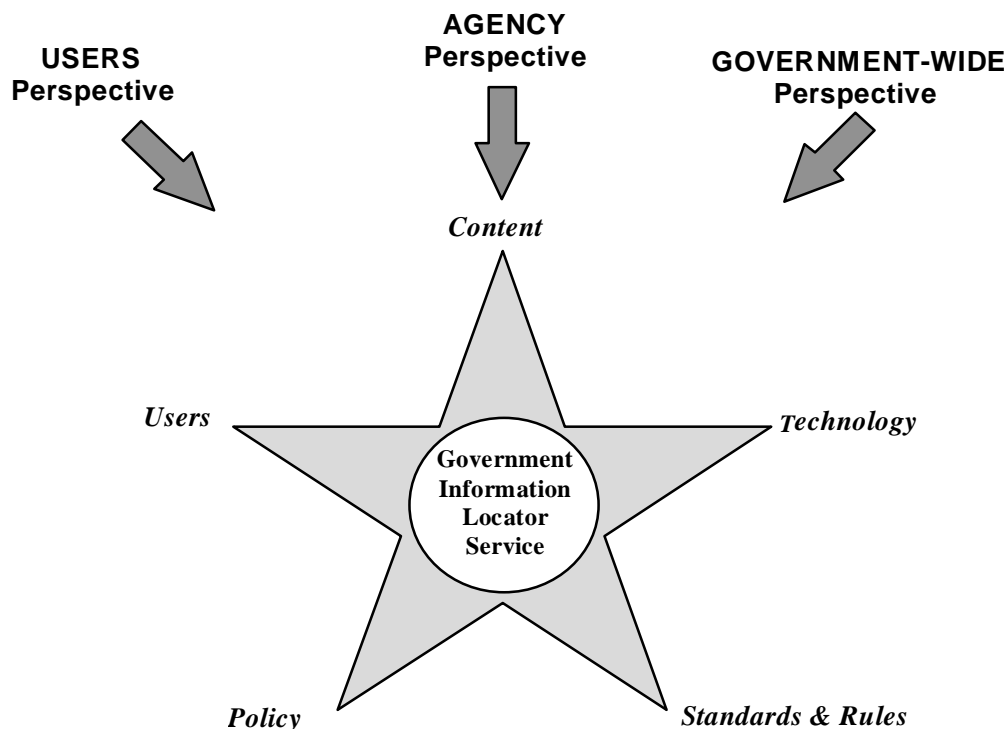
- **Standards and Rules:** utility of standards to ensure consistency in GILS information, to offer broader connection, access, and retrieval of information.

The evaluation framework also includes three perspectives, representing the “views” of various stakeholders in GILS: Users, Agency, and Government–Wide. The three perspectives helped

to focus the evaluation on the need to represent different views held by different stakeholders during implementation and use of a networked–based information service. The investigators were also aware that the study findings would be of interest to people viewing GILS from these various perspectives.

Together the three perspectives and the five dimensions capture the complexity of GILS as a networked information service and guided the research design and data collection activities. Figure 3–1 presents the evaluation framework.

Figure 3–1
Framework for GILS Evaluation:
Perspectives and Dimensions



3.3. EVALUATION GOALS AND STUDY QUESTIONS

The *Technical Proposal* (Moen & McClure, 1996a) enumerated the following goals for the study:

- Examine and describe how GILS is serving users in locating and accessing government information
- Examine and describe agencies' GILS implementation experiences
- Identify and document success factors and/or barriers affecting agencies' GILS implementations
- Examine and describe agencies' use of GILS as an information resources management tool
- Determine if changes to the GILS policies or technical specifications are needed to make it a more useful tool for agency information resources management
- Provide recommendations and strategies that will assist agencies to improve their GILS applications.

At the outset of the evaluation study, the investigators identified a number of study questions, derived from the project goals, to guide initial information gathering and data analysis activities of the project:

- Who are current GILS users?
- How is GILS serving users to locate and access government information?
- What have been agencies' experiences in implementing GILS?
- What are the critical success factors affecting agencies' GILS activities?
- What are the barriers affecting agencies' GILS activities?
- What are GILS "best practices" that could be useful for all agencies?
- How are agencies using GILS as an information management tool?
- To what extent are agencies conforming to *FIPS Pub. 192* (for structure and contents of locator records, and for making their records available via Z39.50)?

- What changes are needed either to GILS policies or technical specifications to improve the utility of GILS for users, agencies, and the Federal government?

The research strategy assumed that the study questions might be refined and modified as the investigators collected and analyzed data. Addressing these and similar study questions, however, helped the researchers link activities directly to project goals.

In the initial stages of research design, the investigators identified research activities that could be used to collect and analyze data needed for an understanding of the current status of GILS. Not all possible activities and techniques originally considered during the design of the study became part of the research activities (e.g., in the technology and standards dimensions of the framework, one activity considered was to test Z39.50 protocol level compliance of the GILS implementations). Resource constraints forced the investigators to select only significant and cost-effective data collection activities that would best serve the purposes and goals of the study.

3.4. THE RESEARCH STRATEGY

The investigators positioned this study within a qualitative, naturalistic research context (Maxwell, 1996; Patton, 1990), although the study also used quantitative techniques and mixed qualitative and quantitative methods (Creswell, 1994). The qualitative context recognizes the evaluation's emphasis on process over measurement, understanding and learning over hypotheses testing. A qualitative research approach was appropriate to produce a richly detailed, holistic understanding of GILS. Moreover, it also allowed study participants to better describe their experiences and use of GILS.

The research strategy provided overall direction to accomplish the purpose and goals of the study. This strategy involved the use of a variety of research techniques and methods, including:

- Site visits
- Focus groups
- Survey
- GILS record content analysis
- Scripted online user assessments
- Web server transaction log analysis
- Policy and literature review.

As the research progressed, the investigators modified specific research techniques and methods to reflect their understanding of GILS.

Each technique and method required the development and testing of procedures and instruments. In some cases, procedures could be lodged within existing and well-known data collection activities. For example, the investigators pre-tested questions and the survey instrument for focus groups and the survey respectively. For three of the techniques, the investigators developed new, exploratory procedures, instruments, and analysis procedures that had not been well-articulated in either the literature or previous research by others. For example, in the case of the record content analysis, no pre-existing operationalization of “GILS record quality” existed.

Early data collection techniques provided the investigators with data that was analyzed and informed subsequent data collection including the HTTP transaction log analysis, scripted online user assessment, and GILS record content analysis. The investigators then analyzed and synthesized data from these data collection techniques to create preliminary findings. Member checks, follow-up interviews, and discussions among the investigators enriched the preliminary findings and served to further the trustworthiness of the data and the findings. As part of the investigators’ concern for trustworthiness, they pre-tested data collection instruments including focus group questions, site visit protocols, and conference survey questions. Figure 3-2 presents an overview of the GILS research design.

The research design was structured yet flexible in allowing refinement of questions and modification

of data collection techniques based upon initial data collection and analysis. Early data collection and analysis informed choices regarding subsequent data collection and analysis. The research design was necessarily evolutionary.

3.5. MULTIPLE METHODS AND SPECIFIC DATA COLLECTION TECHNIQUES

Since an evaluation of GILS needed to examine diverse factors (e.g., nature and type of resources to be described by locator records, agency resources available, etc.), the investigators needed diverse but complementary data gathering techniques to capture as fully as possible the breadth and depth of issues. The investigators matched research information needs (e.g., information needed about each dimension of GILS, and information needed to answer study questions) with appropriate quantitative and qualitative research techniques (Creswell, 1994).

The investigators selected and utilized one or more methods on the basis of satisfying the information needs of each component of the study. As an example, site visits to agencies allowed the investigators to interview agency staff to fully realize all aspects of an agency’s usage and implementation experiences with GILS from various participant perspectives. In a parallel manner, focus group sessions with various types of GILS stakeholders represented opportunities for the investigators to bring together homogeneous groups of stakeholders to represent common-interest perspectives.

These methodologies used theoretical rather than statistical sampling. Unlike the latter, which is designed to provide data subject to statistical verification, theoretical sampling allowed capture of incidents of difference, and, in a progressive fashion, built a broad foundation for subsequent analysis and understanding (Glaser & Strauss, 1967).

Figure 3-2
Overview of GILS Evaluation Research Methodology

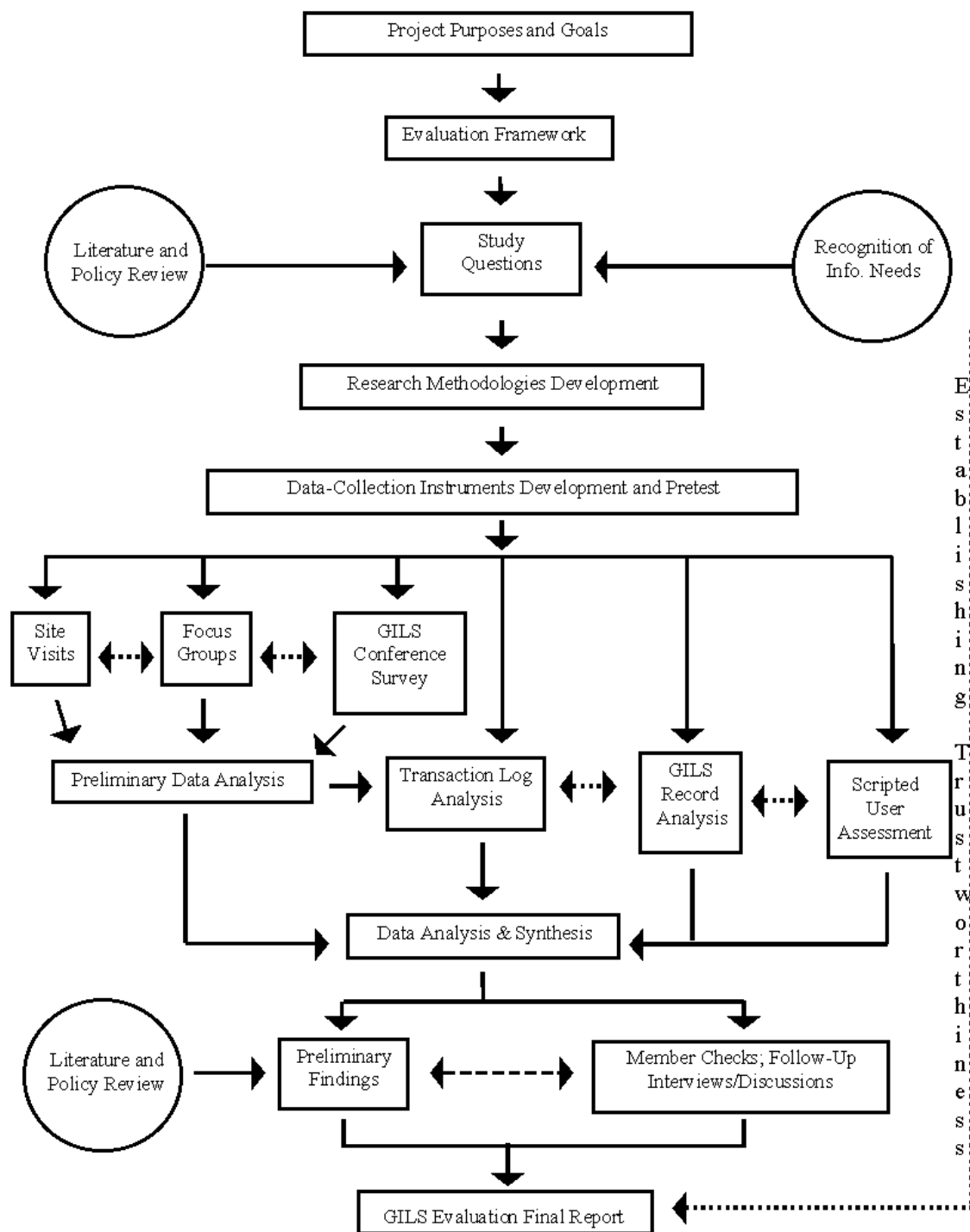


Table 3–1
Data Collection Techniques

Technique	Primary Method	Information Obtained	Forms of Data	Analysis
Site Visits	Qualitative	Agency–specific experiences as described by various agency staff as participants in GILS	Narrative Text	Content Analysis
Focus Groups	Qualitative	Stakeholder–specific perspective on GILS	Narrative Text	Content Analysis
Survey	Quantitative	Quantifiable assessments of key GILS issues	Numeric Data	Descriptive Statistics
GILS Record Content Analysis	Quantitative	Measurement and assessment of GILS record quality	Numeric Data	Descriptive Statistics
Scripted Online User Assessments	Qualitative Quantitative	User’s assessments of GILS as a networked service	Narrative Text Numeric Data	Content Analysis Descriptive Statistics
Web Server Transaction Log Analysis	Quantitative	Machine–generated data of users’ interaction with GILS	Numeric Data	Descriptive Statistics
Policy and Literature Review	Qualitative	Analysis of the policy environment and specific policies providing the context for GILS	Narrative Text	Content Analysis

Table 3–1 summarizes the data collection techniques used in the study. Each technique is associated with one or more primary methods (i.e., qualitative or quantitative), the kind of information obtained, and the form of the resulting data. Study team members then analyzed the resulting data using appropriate analytical techniques.

The following briefly describes each technique and how it was used in the evaluation. Each description includes a summary of number of people involved, activities carried out, etc. For additional detail on each technique, see Appendices C–1 through C–6.

3.5.1. Site Visits

Investigators conducted one–day visits to agencies to observe specific environments of GILS implementation (see Appendix C–1). The following is a list of agencies selected for site visits and the dates of occurrence:

- Department of Defense, Defense Technical Information Center (November 15, 1996)

- Environmental Protection Agency (October 23, 1996)
- Government Printing Office (November 15, 1996)
- Department of Treasury (January 10, 1997).

Investigators carried out guided interviews with personnel from many administrative and functional areas. Site visits also included one focus group of agency staff, examination of relevant agency documentation, and tours/demonstrations. Site visits provided detailed understanding from participants’ perspectives of agency GILS implementation issues. A total of 46 agency staff participated in the site visits.

Through interviews with knowledgeable agency staff (i.e., policymakers, managers, systems/technology staff, intermediaries, librarians, records managers, and agency end users), the investigators collected data to understand and describe agencies’ GILS efforts. The agency site visits enabled the investigators to examine policy, management, technology, and human aspects of

agencies' implementation experiences. Finally, these site visits provided data for detailed case study description of experiences.

The investigators also conducted two additional sets of interviews and discussions during the study. Investigators met with two individuals involved with the planning of the Advanced Search Facility to learn about that technology initiative. Staff at the National Archives and Records Administration (NARA) met with the investigators to discuss GILS-related activities undertaken by NARA (i.e., training and development of record creation guidance). The discussion at NARA also focused on GILS and records management issues that had surfaced during the study.

3.5.2. Focus Groups

Investigators conducted a series of "carefully planned discussion[s] designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment" (Krueger, 1988). Focus groups brought together groups of stakeholders, allowing individuals with common interests an opportunity to explore shared beliefs and goals with respect to GILS (see Appendix C-2). A total of 83 people participated in these focus groups. The following lists the focus groups and dates of occurrence:

- North Texas area Government Documents Librarians (October 31, 1996)
- Public Interest/Public Access Stakeholders (November 13, 1996)
- State/Local GILS Implementors Stakeholders (November 13, 1996)
- Vendor/Technology Stakeholders (November 13, 1996)
- Future Issues Stakeholders (November 14, 1996)
- Records Managers Stakeholders (November 14, 1996)
- Small Agency Council (February 13, 1997).

These sessions provided information about the knowledge and awareness of GILS by important

stakeholder groups and an opportunity to document their expectations and their encounters with GILS. The intent of this data collection activity was to understand users' impressions, understanding, expectations, satisfaction, and frustrations with the current implementations of GILS. As part of the analysis of this data, the investigators identified user requirements that are and are not being met. Further, the investigators were able to compare original objectives of GILS with what users expect today from a government information locator.

3.5.3. Survey

Investigators developed a survey instrument administered to participants of the GILS Conference in November 1996. Respondents assessed key GILS policy and other issues on the questionnaire. The survey also provided assessments of conference participants' knowledge of GILS policies, attitudes, and experiences as well as qualitative information concerning expectations and lessons learned. A total of 181 conference participants completed the survey (see Appendix D-3 for a copy of the instrument and Appendix C-3 for methodology).

3.5.4. Record Content Analysis

Investigators developed a procedure for analyzing the content of GILS records through an examination and assessment of a sample of GILS records from known GILS agency implementations (see Appendix D-4 for a copy of the instrument and Appendix C-4 for methodology). The investigators employed specific tests to operationalize a set of criteria that included accuracy, serviceability, completeness, and currency.

The intent of this research activity was twofold:

- Develop criteria and procedures for assessing GILS records for use in the study and for subsequent adaptation by agencies for their ongoing assessment of record quality.
- Isolate possible trends in GILS record character and quality of the population of GILS records (approximately 5,000).

Investigators selected a sample of 80+ GILS records from 42 agency GILS implementations and examined and coded approximately 4500 data instances in the records for assessment.

3.5.5. Scripted Online User Assessment

Investigators developed an exploratory method of scripted online user assessments to generate an understanding of user expectations for and reactions about GILS (see Appendix D-5 for a copy of the script and Appendix C-5 for methodology). In this data gathering activity, the investigators sought to understand GILS from the perspective of users. The investigators had developed scripted online assessments of networked information resources (e.g., government bulletin boards, and network services) for previous studies (see Bertot & McClure, 1994; Bertot & McClure, 1996a, 1996b). This methodology is exploratory, and its use in the GILS evaluation provided opportunity for enhancement and refinement.

The investigators developed a tightly scripted set of browsing, searching, and retrieval tasks that highlighted salient features targeted for encounter by users. The goal of this scripted assessment was to draw from users the extent to which they understand what GILS is, whether their expectations of GILS are in line with how GILS has been implemented, and to lead to a set of user-based requirements for improvements to GILS. Ten undergraduate and graduate students participated in the assessment.

Like other methods used in the evaluation study, the scripted online user assessment served several purposes. One was to develop and test reliable scripts and assessment procedures suitable for use by agencies in evaluating their specific implementations. The method also informed the investigators' understanding of GILS from the perspective of users.

3.5.6. Web Server Transaction Log Analysis

GILS implementations currently use a base of technology that includes Web browsers, HTTP and

Z39.50 servers. A benefit of GILS implementations using the Web is the availability of a set of common HTTP server transaction log files (Noonan, 1996). The investigators incorporated an exploratory transaction log analysis to assist in the assessment of GILS. In the past, transaction log analysis research has produced methods and procedures for understanding user interaction with online systems. Log analysis in the networked environment, however, is an emerging area of research.

Investigators developed a set of procedures and analyses to examine data from one agency's web server transaction log files. The procedures generated data for statistical analysis of user transaction activity on an agency's GILS server (see Appendices C-6 and E-4).

Using sample data from a single agency's HTTP log files, the investigators tested and refined procedures for statistical analysis of user transactions. Additionally, the investigators developed procedures to discern patterns in user interaction with the Web and GILS information spaces.

The primary intent of this activity was to develop and test new tools for log analysis. The result of this effort is a set of analysis procedures that agencies can use in ongoing assessment of their GILS implementations.

3.5.7. Policy and Literature Review

Investigators completed a review of GILS policy instruments, regulations, laws, and related literature to provide an understanding of the current environment that is the context for GILS implementations (see Chapter 2). This review enabled the investigators to develop recommendations for changes and enhancements to policies—both government-wide and for individual agencies.

This research activity identified the current policy environment for GILS as a basis for synthesizing policy prescriptions and describing GILS in the evolving policy environment. Such analysis was central to clarify and understand the policy context that affects design, management, implementation,

and use of GILS. In addition, the researchers collected and examined agency documents for examples of beneficial and transferable policies. Recommendations could then be offered to clarify, expand, or revise the policy framework for improved coherence and understanding.

3.6. MULTIPLE DIMENSIONS/ MULTIPLE DATA EVENTS

One or more of the techniques described above collected data related to each of the dimensions in the evaluation framework (Figure 3–1). The following sections describe briefly the scope of each dimension and identify data collection activities associated with its study.

3.6.1. Technology

The dimension of technology included technical implementation details such as access mechanisms and implications of certain technology choices by Federal agencies and policymakers. Data collection to explore the technology dimension featured:

- Focus group of information technologists and vendors
- Site visit interviews with information resources management (IRM) staff at several Federal agencies
- Transaction log analysis of agency data
- Interview with Advanced Search Facility (ASF) staff
- Content analysis of GILS records.

At the 1996 GILS conference, the investigators invited vendors and technologists to a focus group session to discuss both existing and future technology options for GILS. This context brought together a group of stakeholders whose views on GILS technology included market potential, feasibility and desirability of future technological developments, and an evaluation of GILS functionality from a group of technology-informed users.

Site visits with IRM staff at selected Federal agencies enriched data gathering through use of personal interviews. Within different agencies, IRM and systems staff fulfilled a variety of roles as part of the process of implementing GILS as a networked information resource. Investigators interviewed those agency staff who guided the GILS technical efforts. These interviews aided in an understanding of key issues, challenges, and critical success factors for the agency.

An additional data gathering technique included an exploratory log analysis activity designed to assist in the evaluation of GILS usage. Transaction analysis of log files from an agency's GILS records provided the investigators with an important tool for understanding usage of a networked-based information service.

3.6.2. Content

The dimension of content, at the macro-level, identified the information resources included or covered in GILS, and at the micro-level concerned the quality, degree of variance, accuracy, and usability of the information resource descriptions covered by GILS. Data gathering techniques for this dimension included:

- Content analysis of GILS records
- Site visit interviews with record creators and others
- Focus group sessions with users, records managers, librarians, and others
- Survey questions related to scope and coverage of GILS records
- Scripted online user assessment.

Investigators developed criteria and assessment methods to evaluate a sample of GILS records. National Archives and Records Administration (NARA) *The Government Information Locator Service: Guidelines for the Preparation of GILS Core Entries* (National Archives and Records Administration, 1995a) provided a basis for the development of the criteria. Agency GILS implementors used these guidelines in creating agency GILS records. To understand implementors'

decision-making with regard to record content, site visits to agencies included interview sessions with record creators. These interviews with the staff who had personal involvement in the record creation process contributed important information on the strategies which shaped decisions about an agency's GILS records. Focus group sessions, survey questions, and user assessment also provided the investigators with perceptions and perspectives on the usefulness and value of GILS records from different user groups.

3.6.3. Users

The user dimension concerned identification of GILS users: their needs, their usage of GILS, and their satisfaction with GILS. Data gathering techniques for this dimension included:

- Scripted online user assessment
- Focus groups with government document librarians, records managers, and public interest groups
- Site visit interviews with agency staff who are GILS users, and with intermediaries
- Focus group with state and local GILS implementors
- Focus group with records managers
- Survey.

GILS users are not a homogeneous group, but rather consist of a variety of separate user groups including librarians, public citizens, records managers and other staff members at the implementing agencies, and state and local GILS implementors.

Agency site visit interviews included discussions with staff to learn about that agency's efforts to involve users in the agency's planning activity and the agency's experiences with public use of GILS as an effective means to obtain government information. Site visit interviews with agency staff who directly supported public access to government information also provided information on users' perceptions of GILS. A number of the focus groups gathered information about specific groups of users such as records managers, librarians, and public

interest groups. The scripted online user assessment collected data on users' interaction and response to specific GILS implementations.

3.6.4. Policy

The policy dimension of the evaluation framework described the policy environment for U.S. Federal GILS implementation. Data gathering events and activities for this dimension included:

- Policy review and analysis
- Focus group with Federal information policymakers (included in Future Issues Stakeholder session)
- Site visit interviews with agency policymakers
- Survey.

Investigators conducted a policy review of legislation, executive orders, and other guidelines which represented formal information policy with respect to GILS. The review highlighted key policy issues as well as identified changes in policy since GILS' inception in 1994.

Focus group sessions with Federal information policy stakeholders and site visit interviews with agency policymakers provided opportunities for important stakeholder groups to not only inform the investigators as to current and future policy goals in this area but also to share among themselves mutual insights and concerns. Site visit interviews enabled the investigators to gain an understanding of agencies' internal policy with respect to networked information resources. Investigators obtained and analyzed agency policies and guidelines when available. Finally, the survey included questions about respondents' familiarity and understanding of information policy sources for GILS as well as assessment of existing policy guidance.

3.6.5. Standards and Rules

The standards and rules dimension addressed the utility of standards to ensure consistency in GILS information, and the use of this means to support broader connection, access, and retrieval of

information. Data gathering techniques for this dimension included:

- Site visit interviews with agency staff about the role of standards and the use of Z39.50 in GILS
- Site visit interviews with agency staff regarding the general awareness and use of NARA guidelines for record creation
- Content analysis of GILS records
- Survey
- Focus group sessions with users about the value of standards and the general level of awareness of standards with respect to GILS.

The investigators interviewed administrators and IRM staff at Federal agencies to learn of their general awareness of standards and specific use of Z39.50 within that agency's implementation. The survey included questions designed to elicit respondents' awareness and usage of standards.

It is important to note that the five dimensions of the evaluation framework and the multiple data collection techniques did not exist in isolation from each other. Multiple data collection techniques not only enabled the investigators to explore aspects of any one dimension from a variety of perspectives but also provided for exploration of the relationships and interaction of these dimensions. The combination of study activities resulted in an integrated and carefully constructed view of U.S. Federal GILS implementation.

3.7. AN INTEGRATED VIEW OF GILS

The research strategy developed for the assessment and evaluation of GILS incorporated multiple methods and techniques to arrive at a holistic view of GILS and to address the study questions posed at the outset. These data collection and analysis activities provided macro-, midlevel-, and micro-views of GILS. The macro-view allowed the investigators to examine broader policy and organizational issues related to GILS. At the midlevel, user groups provided insight into their understanding and expectation of GILS. And at the

micro-level, the record content analysis and individual scripted online user assessments identified and assessed discrete aspects of GILS that informed recommendations on improving GILS. When combined and synthesized, these views allowed the investigators to gain a holistic understanding of many aspects of GILS.

3.8. CONCLUSION

For this evaluation study, the investigators devised an innovative research approach to explore the multi-faceted nature that we assert is not only characteristic of GILS but of other complex networked information services. The investigators also developed and enhanced specific user-based data collection techniques for the evaluation and combined these techniques in effective ways to understand and evaluate the current state of GILS implementations. User-based assessments can be a countervailing force to the glamour and hype of the

sophisticated technology that provides such vital ways of organizing and accessing information in the digital age.

Both the number and array of data-gathering techniques employed by the investigators produced not only an integrated set of wide-angle and zoom "snap shots" of GILS but also a set of procedures that can be useful to agencies when assessing their own GILS implementations (see Appendices C-1 through C-6). The investigators hope that information policymakers as well as networked services implementors will build on and refine the procedures specified for record content analysis, transaction log analysis, and scripted online user assessments to serve tactical and strategic objectives for information resource management.

The evaluation literature addressing digital libraries reflects the need for multi-method and multi-level assessment of complex networked information services (Bishop, 1995). GILS is also a complex information service existing within the larger networked information infrastructure. The findings reported in Chapter 4 underscore the complexity of the implementation, coordination, and utility of networked information services.

